The Gage

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ABRFC

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In This Issue

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Advanced Hydrologic Prediction Services

By Tracy Howieson

The National Weather Service (NWS) is currently enhancing the existing suite of hydrologic products and services with the implementation of the Advanced Hydrologic Prediction Service (AHPS). AHPS is a national initiative that will provide users with many new services, including short and long term probabilistic forecasts, flood inundation mapping, and numerous graphical products that will be available via the Internet.

The Arkansas Red Basin River Forecast Center (ABRFC) has begun to implement AHPS in the headwaters of the Arkansas River in Colorado, with the intent of providing long range probabilistic forecasts. The current project area includes the drainage area of the Arkansas River above Pueblo Reservoir. This area has many water management issues and the users will be able to make more informed water management decisions with the use of probabilistic forecasts.

To implement probabilistic forecasts, the NWS River Forecast Centers (RFCs) must calibrate and implement the Ensemble Streamflow Prediction (ESP) model. This model utilizes historical precipitation, temperature, and streamflow data; forecasted precipitation and temperature from the Climate Prediction Center; and current conditions based on the soil moisture states in the National Weather Service River Forecast System (NWSRFS) hydrological model. The results from the ESP model are then used to create various graphics depicting the forecasts.

The ABRFC is currently in the historical data collection phase of this implementation. This phase is nearing completion and the next phase will be to recalibrate the NWSRFS model in Colorado to support the updating of the current ESP model. After obtaining reasonable calibration results, the ESP model will be reconstructed around the results of all the above steps.

At this time, the ABRFC plans to issue two types of probability plots, a weekly exceedance plot and a long-range exceedance plot. Each plot will have three separate graphics depicting stage, flow, and volume. Figures 1 and 2 (shown on page 2) are examples of the weekly and long-range exceedance plots for flow at Canon City, CO.

continued on page 2

Photograph above shows Beavers Bend near Broken Bow Lake in Southeastern Oklahoma
Courtesy Charles S. Lewallen: http://www.biosurvey.ou.edu/okwild/Intro.html.

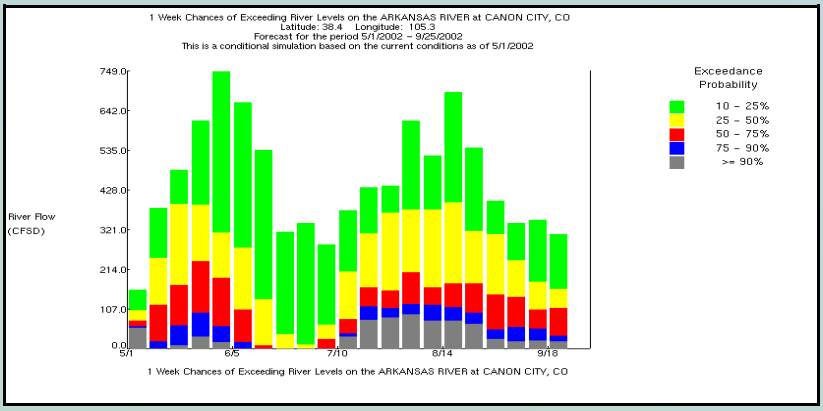

Figure 1 *(to the left):* Weekly Exceedance Plot for Flow at Canon City, CO

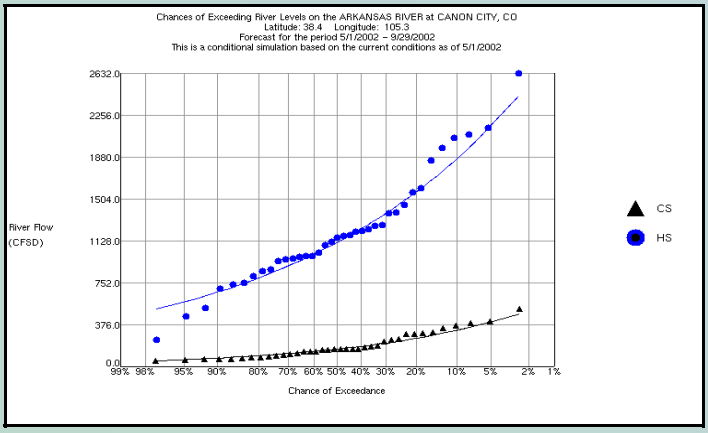

Figure 2 *(to the right):* Long Range Exceedance Plot for Flow at Canon City, CO.

CS indicates the Conditional Simulation.
HS indicates the Historical Simulation.

The ABRFC will be implementing these AHPS graphics shown in Figures 1 and 2 for the project area by the end of June 2002. The future AHPS implementation dates for the remainder of the ABRFC area are illustrated in Figure 3.

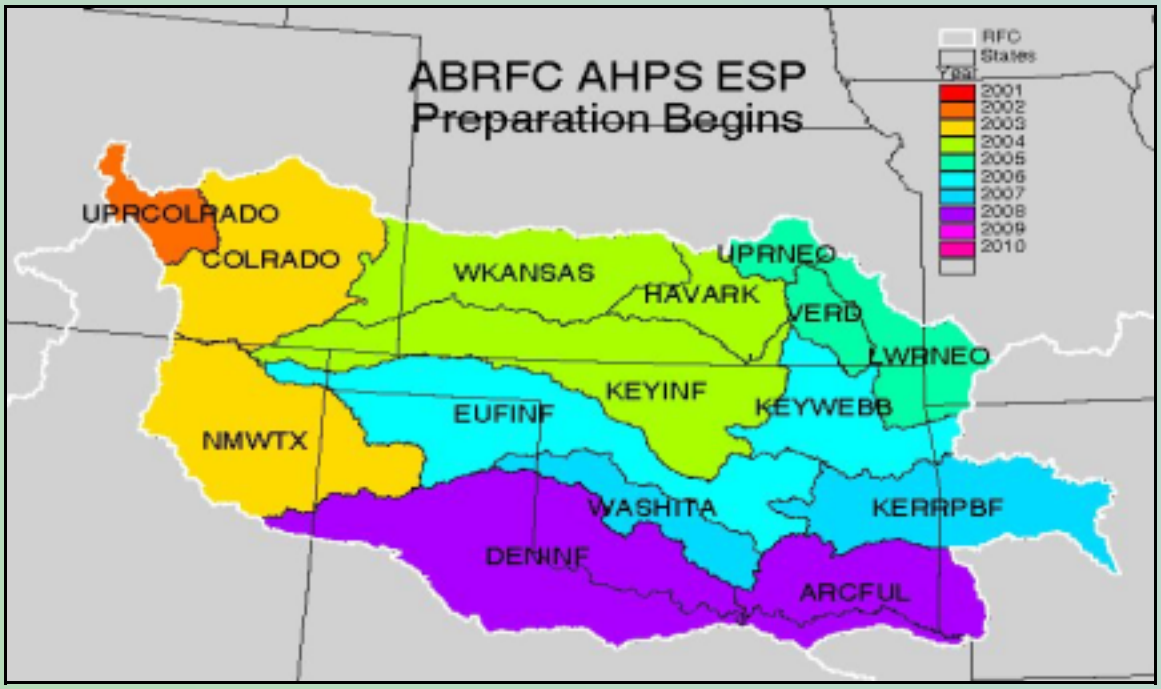

Figure 3. ABRFC AHPS Implementation Schedule

News From the Hydrologist In Charge

by Billy Olsen

Thus far, this spring has brought somewhat below average flooding activity to the ABRFC area of responsibility. We have had a few significant events in eastern Oklahoma and west-central Arkansas, but the flooding was of fairly short duration each time. Perhaps the most interesting hydrologic event this spring has been the saga of Hulah Lake, a Corps of Engineers reservoir in northeast Oklahoma. The reservoir serves as the source of the municipal water supply for Bartlesville, Oklahoma, a city with a population of 35,000. Due to an extended but very localized drought, the city had been under severe water restrictions for quite some time and had to make special arrangements with the Corps to obtain water from another source. After the Hulah basin recorded 300% of normal rainfall during February 2001, the next 13 months averaged just 55% of normal. During this period, the lake pool level had fallen such that only 30% of the conservation pool storage remained. Fortunately, the last week of April and the first week of May 2002 brought three storms which left a basin total of about two inches of rain to moisten the soil. On May 9, after another stormed dumped 3.5 inches of rain in a short time on the basin, the Hulah pool elevation rose to fill 10% of the flood pool and required high releases to bring the pool back down to operational limits for this time of year. This all amounted to quite a wild ride for the Hulah Lake interests. The ABRFC and the NWS WFO-Tulsa participated in several task force meetings on the drought issues. The lake had gone from 25% of flood pool occupied in Feb. 2001 to only 30% of the conservation pool remaining in April 2002 back to 10% of flood pool occupied in May 2002. This was just another case of "feast or famine" averaging out to normal in the world of the hydrology record books.

Figure 1 *(above)*: Hulah Lake when it was at very low levels. (Courtesy Theresa Hampton.)

Figure 2 *(above)*: Hulah Lake in April 2002. It clearly shows how low the lake was in reference to the dam. (Courtesy Glenda Vincent with the US Corp of Engineers.)

Figure 3 *(to the Left)*: Hulah Lake Captured on May 18, 2002. The lake, in contrast to figure 1, is 2 feet above normal. (Courtesy Hulah Dam Tender.)

Know Our WFOs : Little Rock, Arkansas

by John Schmidt

NWS flood warning responsibility for the majority of the state of Arkansas falls on the Little Rock WFO. Three major river systems drain the state; the White, the Arkansas and the Ouachita. The ABRFC is responsible for providing river forecast guidance and hydrometeorologic products for the Arkansas River and its tributaries above Pine Bluff, AR while the Lower Mississippi RFC in Slidell, LA is responsible for the remainder of the state (Figure 1).

The mainstem Arkansas River is navigable along its entire length in Arkansas due to twelve USACE locks and dams that maintain a minimum depth of 9 feet. Above Pine Bluff, the ABRFC provides daily river forecast guidance at Ozark, Dardanelle, Morrilton, Toad Suck Ferry, Little Rock and Pine Bluff. Additionally, flood forecast guidance is provided along the Fourche La Fave River at Aplin and Houston, the Petit Jean River at Danville and the Mulberry River at Mulberry. Due to a multitude of USACE flood control structures in eastern Oklahoma and in Arkansas, mainstem Arkansas River flooding is not as frequent or as significant as it once was. The peak discharge along the Arkansas River in Little Rock's HSA was 683,000 cfs in May, 1943 at Dardanelle. This was before the completion of flood control structures. Since completion, the maximum discharge has been 433,000 cfs in May, 1990 at Dardanelle.

The Arkansas River basin in Arkansas is one of the wettest areas of the ABRFC area. Average annual precipitation ranges from 45 to 60 inches, from the Arkansas River valley to the peaks of the Ouachita Mountains, respectively. Climatologically, there are two time periods when rainfall is at its maximum, April-May and November-December, but heavy rain can occur any time of the year. Due to these heavy rains, tributaries of the Arkansas can experience some very significant flows. In fact, the Mulberry River at Mulberry has the dubious honor of being listed among the top one percent of rivers in America when comparing maximum instantaneous river discharge to drainage area.

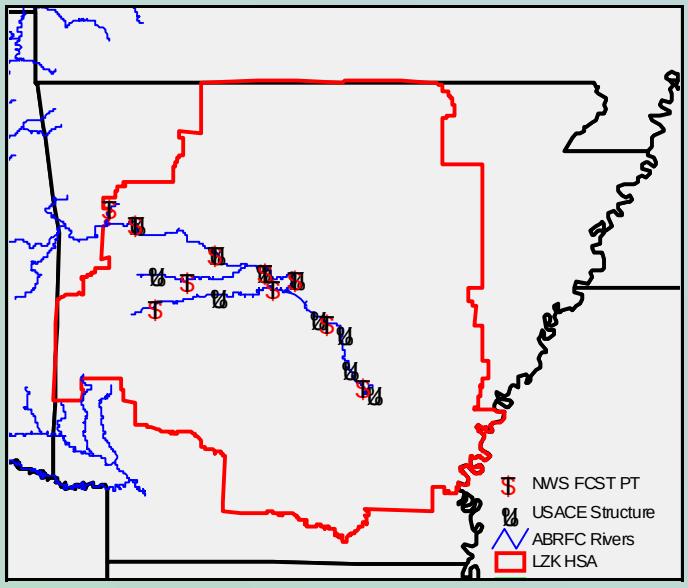

Figure 1: Little Rock WFO area of responsibility.

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Acronyms in this Edition

ABRFC – Arkansas-Red Basin River Forecast Center
AHPS – Advanced Hydrologic Prediction Service
CWA – County Warning Area
cfs – cubic feet per second
ESP – Ensemble Streamflow Prediction
HSA – Hydrologic Service Area
NWS – National Weather Service
NWSRFS – National Weather Service River Forecast System
RFC – River Forecast Center
USACE – United States Army Corp of Engineers
WFO – National Weather Service Forecast Office